

# South Carolina's Suicide Mortality in the 1970s

*Findings in this analysis support previously noted differences between the Southeast and the nation in the statistics concerning suicide.*

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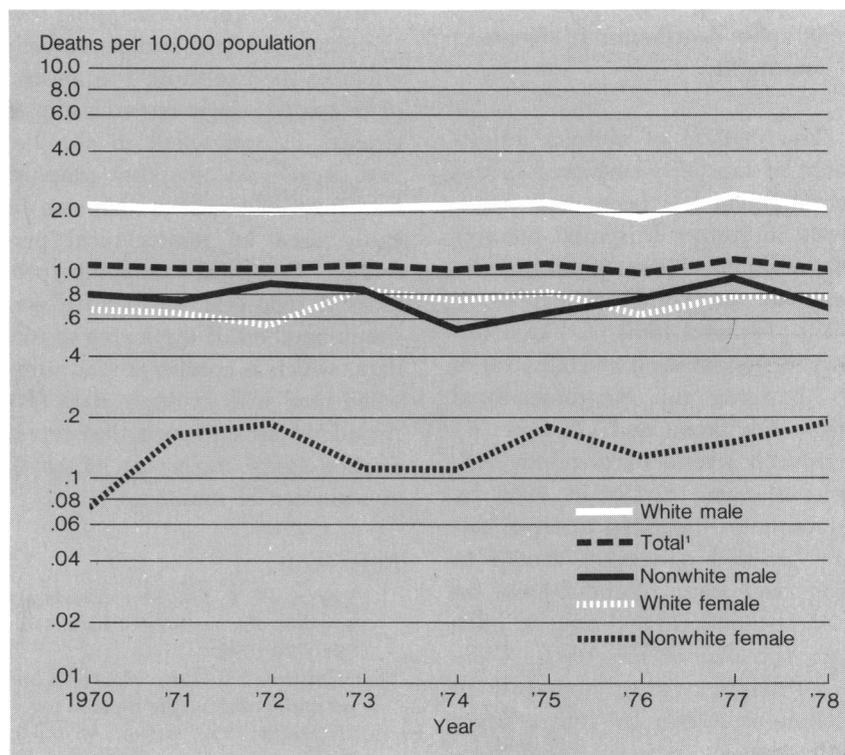
THE EVALUATION OF VITAL RECORDS was one of the earliest techniques employed in the study of suicide and has proved to be one of the most durable. Although vital statistics may have only limited value in interpreting the sociology of suicide or in understanding the psychology of its victims, these statistics nonetheless continue to provide useful information on the epidemiology of suicide in particular societies (1).

In the United States, statistics on suicide, like other official causes of death, are compiled from the underlying causes of death reported on death certificates. Although subject to the same errors in recording, interpretation, and coding as are most fatal processes, suicide and the other external causes of death, such as homicide and accidents, are vulnerable to additional sources of error. Reporting errors stem in part from the Western cul-

tural ethic against death by suicide and the societal sanctions against it. Consequently, suicide deaths may be hidden, obscured, or simply go unrecognized as attributable to that cause. The resulting underestima-

tion has been well documented (2-5). A further consequence, and a necessary one, is that society itself intrudes directly—through the active involvement of the coroner or the medical examiner system—

Figure 1. Yearly suicide death rates of South Carolina residents, by race and sex, 1970-78



<sup>1</sup>Total directly adjusted for age, race, and sex to 1970 South Carolina population.

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on the certification of the death process.

Although the fact of death and the biological mechanism of death are generally certified by a clinical physician or a medical examiner, a nonprofessional public official, the coroner, may also assume this function in many States including South Carolina. The coroner or medical examiner, depending on the local government's regulations, has the additional duty of determining the legal classification of a death. That is, he or she must determine if a death is attributable to accident, homicide, suicide, or some other cause. The category to which a death is assigned depends on a number of variables including the evidence around the body, the statements of relatives, friends, and witnesses, the environment in which the death occurred, and the personality, experience, and expertise of the person required to make the judgment.

The presumption of innocence in the legal system of the United States, as well as the moral and legal stigmas attached to suicide, make the determination of death

by suicide a decision that must be proved by evidence, rather than presumed from circumstance (2). For the most part, deaths that are reported as suicides are generally those that could be attributed only to that cause. The legal system itself, therefore, assures that vital records will underestimate the true incidence of suicide. The system further assures that deaths that are so recorded are those of people believed likely to commit suicide and that result from methods believed associated with suicide, for example, prisoners who hang themselves.

Obviously, the qualifications of the person required to make the determination may influence his or her likelihood of categorizing a specific death as suicide. It is conceivable, therefore, that an untrained, inexperienced, elected coroner without the support of a forensic pathologist might make a determination different from that of a trained, appointed medical examiner. Insofar as the personal characteristics of the official affect his or her judgment, the determination may be further biased. Be-

cause of these factors, vital statistics data on suicide death rates are biased underestimates that are subject to unintentional but direct influence by the structure and officials of the local government.

Despite problems inherent in these data, statistical data on suicides yield information analogous to that obtained from reports of infectious disease. They cannot provide information on the process that leads to suicide or highly accurate epidemiologic information on the incidence of completed suicides, but the statistics nonetheless serve an important function as an indicator of the magnitude of the problem in our society.

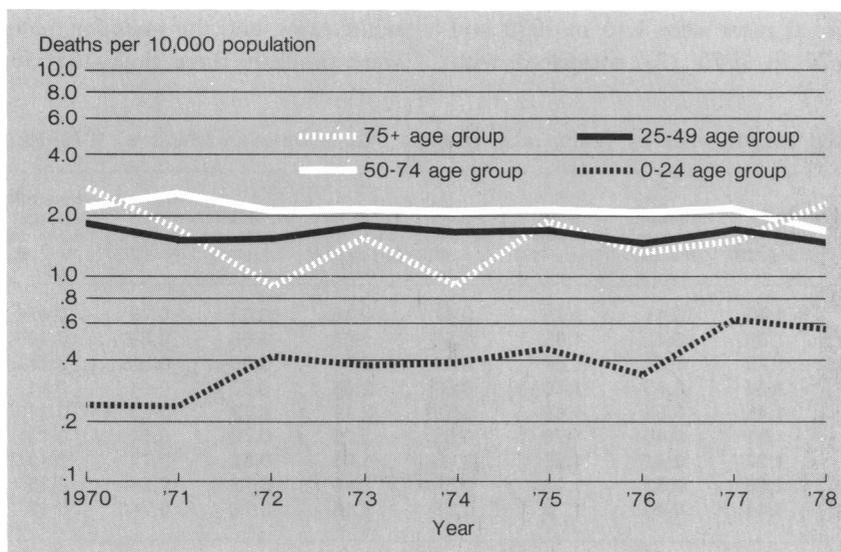
Believing this consideration to be relevant, we decided to review the vital records of South Carolina for the 9-year period 1970-78 to examine the distribution of suicides over time and within various groups as one part in a larger descriptive study of the epidemiology of all external causes of death in the State. During the period of study, South Carolina began an era of rapid industrialization and population growth. We believed, therefore, that the information on suicide for this interval might be of more than usual sociological interest.

Because the State lacked a uniform coroner or medical examiner system, we also hoped that effects of the different death certification processes might be discerned in the data.

## Methods

The source of data for this study was the Resident Death File for 1970-78, provided by the Office of Vital Records and Public Health Statistics, South Carolina Department of Health and Environmental Control. Deaths recorded as suicides were identified as all cases having as underlying cause of death

Figure 2. Yearly suicide death rates of South Carolina residents, by 25-year age groups, 1970-78



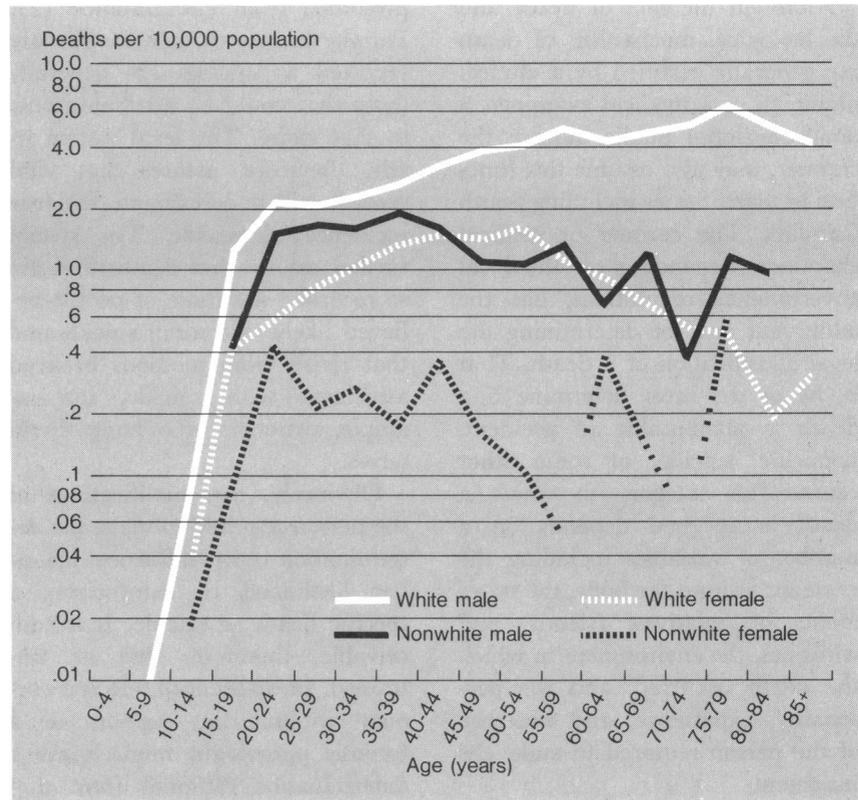
the Eighth Revision ICDA code of E950-E959 (6).

Because of rapid changes in the distribution of South Carolina's population over the study period, as well as geographic variation in the State's demographic characteristics, suicide mortality rates were adjusted to remove bias attributable to demographic variability. The adjusted rates displayed were calculated by the direct method; the 1970 South Carolina population was the standard. All rates were calculated per 10,000 population rather than by using the conventional population size reference of 100,000. Since 40 of 46 South Carolina counties had populations less than 100,000 in 1975, the smaller reference value is believed to yield results which are more comprehensible in terms of the number of deaths actually experienced. Population estimates for rate calculations were obtained from the South Carolina Division of Research and Statistical Services. Statistical significance testing, primarily linear regression analysis, Poisson and chi-square, were not corrected for multiple comparisons.

## Results

During the 9-year period, 2,763 suicides were recorded for South Carolina residents. The yearly age-, race-, and sex-adjusted suicide rates

Figure 3. Average annual suicide death rates of South Carolina residents, by age, according to race and sex groups, 1970-78



remained fairly constant throughout the study period; a high rate of 1.17 was observed in 1977 (table 1). In comparison with national data, the annual, unadjusted suicide rates for South Carolina were slightly below those for the United States during the period. The national rates were 1.15 in 1970 and 1.27 in 1975 (7) compared with

the South Carolina rates of 1.10 in 1970 and 1.16 in 1975.

White males had, as expected, the highest suicide rates, and nonwhite females, the lowest rates. Detailed in table 1, the unadjusted or crude annual rates for whites were approximately three times the nonwhite rates, and the rates for males were similarly three times that for

Table 1. Crude and age-race-sex adjusted suicide rates by years, race, and sex, South Carolina residents, 1970-78

Year	Total numbers	Total crude rate (N = 2,763)	Total age-race-sex adjusted rate <sup>1</sup> (N = 2,763)	White crude rate (N = 2,426)	Nonwhite crude rate (N = 337)	Male crude rate (N = 2,093)	Female crude rate (N = 670)	White male crude rate (N = 1,814)	White female crude rate (N = 612)	Nonwhite male crude rate (N = 279)	Nonwhite female crude rate (N = 58)
1970	285	1.10	1.10	1.40	0.41	1.75	0.47	2.15	0.65	0.79	0.07
1971	282	1.07	1.06	1.36	0.42	1.65	0.50	2.06	0.66	0.69	0.16
1972	281	1.05	1.03	1.29	0.51	1.68	0.44	2.04	0.56	0.86	0.18
1973	308	1.13	1.11	1.44	0.45	1.70	0.59	2.08	0.81	0.81	0.11
1974	303	1.09	1.07	1.45	0.31	1.68	0.53	2.19	0.73	0.53	0.11
1975	328	1.16	1.13	1.51	0.40	1.76	0.59	2.26	0.79	0.64	0.18
1976	285	1.00	0.96	1.27	0.42	1.56	0.46	1.93	0.62	0.74	0.13
1977	359	1.25	1.17	1.58	0.53	1.95	0.58	2.40	0.78	0.94	0.15
1978	332	1.14	1.08	1.46	0.45	1.73	0.58	2.18	0.76	0.74	0.19

<sup>1</sup> Directly adjusted to 1970 South Carolina population.

females. In previous studies of national data or data from specific localized areas, researchers reported comparable male to female ratios for suicide rates (2-4,8,9).

The annual unadjusted suicide rates for South Carolina white females roughly approximated the national rates, but the State rate for white males was slightly in excess of the national average. The rates for nonwhite South Carolinians of both sexes were below the national rates for the time period. The national rates for nonwhite females were two to three times greater than those for the State (7). However, the State rate for this group appeared to increase over time, although the rise is not statistically significant (fig. 1).

The increasing proportion of suicides in the younger age groups observed in the 1970s in South Carolina was consistent with national trends (10). Figure 2 depicts rates of suicide deaths by year for 25-year age groups. Although the rates for the age group 50-74 years decreased significantly ( $P <$

.05), the rates for the age group 0-24 years increased significantly ( $P <$  .05). Between 1970 and 1978 suicides rose from the fourth to the second leading cause of death in 15- to 24-year-olds in South Carolina. This change reflects an increase for this age group in the proportion of all deaths attributed to suicide from 4.1 percent in 1970 to 10.4 percent in 1978 (11,12).

Average annual suicide rates by age for race-sex groups are shown in figure 3. The rate for white males, the highest, exhibited a fairly steady increase up to late in the eighth decade of life (6.0 maximum rate). The rate for nonwhite males peaked at 1.8 in the late thirties and then declined. A more gradual increase in the rate for white females occurred, reaching 1.6, its highest point, in the 50-54 age group. The absence or small number of suicides of nonwhite females in the different age groups precludes the identification of a definite trend in suicide mortality rates by age. Although a general increase occurred in the average

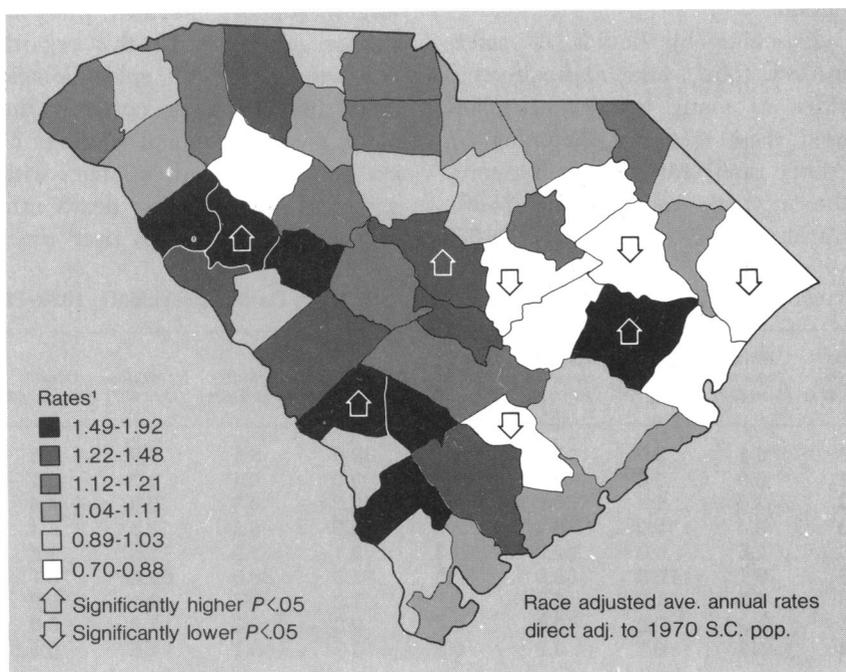
annual rates, the general pattern of rates by age for race-sex groups shown in figure 3 remains strikingly similar to comparable regional data of 25 years ago (13).

Race-adjusted average annual suicide rates were mapped by county (fig. 4). The 7 counties with the highest rates are all predominantly rural, and 6 of these counties are located within 50 miles of the Savannah River along the western border of the State. With the one exception, the counties in the north-eastern portion of the State have relatively low suicide rates.

A frequency distribution of race-adjusted county suicide rates is presented in figure 5. The distribution is skewed toward the higher rate tail. An analysis of the observed to the expected mortality rate for each county, based upon the ratio of a Poisson variable to its expectation (14), indicates that at the 95 percent confidence level the observed ratio was significantly different for eight counties: four were higher than expected, and four were lower. While no geographic pattern among the significantly higher counties is discernible (fig. 4), the counties with the lower rates appear to be concentrated in the eastern part of the State. No urban-rural relationship is apparent.

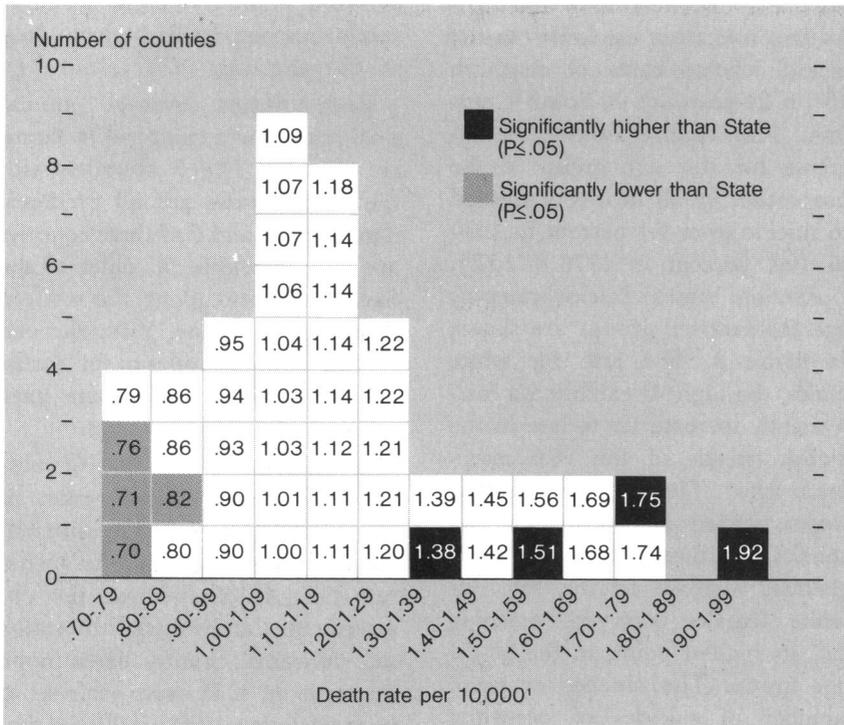
The methods used in committing suicide showed a fairly consistent pattern in the 1970s, with firearms accounting for 78.7 percent of the deaths. Table 2 displays the average annual percentage distribution of methods of suicide within race and sex groups. Firearms were used by 80.6 percent of the white males but by only 56.9 percent of the nonwhite females. National data indicate that 62.1 percent of males' suicides involved firearms in 1975 (7). The use of firearms as a method of suicide by the South Carolina residents was noticeably above the

Figure 4. Suicide death rates by county—South Carolina, 1970-78



<sup>1</sup>Average annual rates directly adjusted for race to 1970 South Carolina population.

Figure 5. Frequency distribution of race-adjusted average annual death rates by county, suicides of South Carolina residents, 1970-78



<sup>1</sup>Directly adjusted to 1970 South Carolina population.

national average, particularly for females. In 1975, the percentage of females using firearms to commit suicide was 74.1 percent in South Carolina compared with a national average of 36.1 percent (7).

Strangulation, which includes hanging, is the second most frequently used method and, proportionally, it was used twice as often by nonwhites as by whites. This difference can be attributed mainly

to nonwhite males. The proportion of males choosing this method in 1975 was 8.6 percent in South Carolina and 14.3 percent in the nation.

Poisoning by liquids or solids ranked third, and approximately twice as many females as males used these methods. Poisoning by "other gases" ranked fourth among the methods used in the South Carolina suicides. In 1975, 18.9

percent of South Carolina females used poisons, all forms, compared with 42.1 percent of the females in the nation (7).

The use of only three methods varied noticeably by age group. Firearms played a role in approximately 70 percent of the suicides of those under 25 years, but they accounted for more than 80 percent of the suicides of those 45 and older. The use of hanging or strangulation was higher among people in their late teens and twenties. For the 15-19-year-old groups, 12.8 percent had used this method of suicide as compared with an average of 7.1 percent overall. Poisoning by liquids or solids accounts for 18.2 percent of the suicides of 10-14-year-olds and approximately 10 percent of the 15-25-year-olds, but this method was a factor in less than 4 percent of the suicides of persons over 45 years of age.

## Discussion

Differences between suicide statistics for the Southeast and the nation are often noted. Our findings largely support previous work in suicide mortality. In this regard, the results are of epidemiologic value in confirming not only the more general national findings of sex differentials, rate changes with age, and an increasing death rate in younger age groups over time,

Table 2. Average annual percentage distribution of suicides by method, race, and sex, South Carolina residents, 1970-78

ICDA code no. and method	White males (N = 1,814)	White females (N = 612)	Nonwhite males (N = 279)	Nonwhite females (N = 58)	Males (N = 2,093)	Females (N = 670)	Whites (N = 2,426)	Nonwhites (N = 337)	Overall (N = 2,763)
E950—Poison (liquid or solid) . . . . .	3.9	10.1	3.6	15.5	3.9	10.6	5.5	5.6	5.5
E951—Poison (gases in domestic use) . . . . .	0.1	0.0	0.0	0.0	0.1	0.0	0.1	0.0	0.1
E952—Poison (gases, other) . . . . .	5.3	3.6	1.1	0.0	4.7	3.3	4.9	0.9	4.4
E953—Strangulation, hanging . . . . .	7.3	3.4	13.6	8.6	8.2	3.9	6.3	12.8	7.1
E954—Drowning . . . . .	0.8	2.5	5.0	10.3	1.3	3.1	1.2	5.9	1.8
E955—Firearms, explosives . . . . .	80.6	78.1	72.0	56.9	79.5	76.3	80.0	69.4	78.7
E956—Cutting, piercing instruments . . . . .	0.6	1.0	1.8	3.4	0.7	1.2	0.7	2.1	0.8
E957—Jumping . . . . .	0.5	1.0	2.2	0.0	0.7	0.9	0.6	1.8	0.8
E958—Other, unspecified means . . . . .	0.9	0.3	0.7	5.2	0.9	0.7	0.7	1.5	0.8
Total . . . . .	100.0	100.0	100.0	99.9	100.0	100.0	100.0	100.0	100.0

but also the findings peculiar to the southeastern United States. These regional differences include lower overall rates, greater differentials between races, and greater use of firearms in all race-sex groups than in the country as a whole.

Evaluation of the South Carolina data in detail, however, brings up a number of points with implications that differ from previously reported data. First, although methods of suicide used by males and females do differ significantly when all methods are considered, there is no appreciable difference between the sexes in the percentage who use firearms. This observation is in contrast to the data for the United States as a whole, which show that the use of firearms by males is approximately twice that of females. In terms of average percentages, use of firearms by South Carolina females was higher than their use by males in the nation. Nevertheless, the suicide rate observed for this State's females is about the same or lower as the national rate for females.

This observation implies that in South Carolina the choice of method is not a major factor in the lower rates for females than for males. This conclusion is contrary to previous theories (2,15,16). That is, the rate for South Carolina males is not higher than for females simply because males choose more lethal methods and thus "succeed" more often or because firearms use is more likely to be recognized as suicide and coded in the vital records as such. While both factors may be operative, if their effects are of any magnitude in this State, either the male and female suicide rates should be closer in value or the percentage who use firearms should be proportionally different. Instead, the sex differential in suicide death rates is comparable to that observed nationally,

while firearm use within the State is nearly equal for the sexes. Of particular import is the low suicide rate for nonwhite females who, relative to national data, use a high percentage of firearms, although their suicide rate is the lowest of the race-sex groups in the State.

Other researchers have proposed that the level of firearms use in the South is a function of socialization, pointing out that firearms play a greater role in the lifestyle of southerners than of nonsoutherners. They question whether a relationship exists between the lethality of firearms and the suicide rate (17,18). These South Carolina data provide strong evidence to support this assertion.

The clear rise in suicides in people under 25 years old is quite apparent over the 9-year period examined. The increase in suicides of the young has been observed throughout the country and certainly represents a matter of concern. Accompanying this increase is a significant decline in rates of the 50-74 year age group. Since this age group exhibits the highest average rate for the study period, this reduction in suicide mortality is noteworthy.

The geographic analysis of suicide rates by county failed to distinguish a pattern between the few counties having direct access to a medical examiner or a forensically trained pathologist and the counties relying on the State's general referral system for pathological evaluation of suspicious deaths. As this tangential issue is analyzed only to the extent that an obvious finding will not be overlooked, the lack of a noticeable difference cannot be interpreted as no difference. A detailed analysis of all external causes of death, supplemented by other sources of mortality data, would be required to examine adequately any existing differences.

A finding of some interest is the urban-rural distribution of suicide rates in South Carolina. South Carolina has 46 counties, and in 1970 only 6 had more than 50 percent of their population classified as urban (19). In this study, no notable urban-rural pattern in the race-adjusted county suicide rates was observed. The highest rates were found, interestingly, in primarily rural counties. Of the four counties that had significantly high rates, only one is predominantly urban. In general, the suicide death rates of the more urban counties were near the median of the distribution displayed in figure 5.

The variation observed between national and southern suicide rates may well be related to broader cultural factors rather than to sharp urban-rural differences. This interpretation does, however, call for a more detailed appraisal. Suicide rates of white South Carolinians are roughly similar to their national counterparts. Previously, one might have argued that increased firearm usage counteracted possible deterrents to suicide present in the southern culture, such as less crowding, less social and environmental stress, and a greater social support network, thus causing rates similar to the national average. Now this premise is questionable. If the percentage of those using firearms does not play a significant contributing role in determining the suicide rate, then the assumed beneficial southern cultural differences must have largely disappeared or have a more questionable impact, at least among whites. The cultural difference hypothesis, however, may still apply to nonwhites. Despite higher firearms usage, the rates of suicides among southern nonwhites are well below the national average for nonwhites.

The differences between suicide rates of southerners and the na-

tional rates need to be given greater attention by social and behavioral scientists concerned with suicide. As exceptions to observed national trends, these differences provide a fertile testing ground for the generalizability and interconnectivity of theories regarding suicide. Toward this end, the continued examination of vital records data remains a valid supportive technique.

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## SYNOPSIS

ALEXANDER, GREG R. (University of South Carolina School of Medicine), GIBBS, TYSON, MASSEY, RONNIE M., and ALTEKRUSE, JOAN M.: *South Carolina's suicide mortality in the 1970s. Public Health Reports, Vol. 97, September-October 1982, pp. 476-482.*

In an epidemiologic study of suicide mortality among South Carolina residents for the years 1970-78, death certificates for 2,763 persons were reviewed. The overall suicide rates were lower than those observed in the same period for the United States. As expected, the highest rates were among white males; females and nonwhite males had rates with intermediate values, and nonwhite females, the

lowest rates. Rates for white males increased up to age 75. All other race-sex groups peaked at much younger ages. An increase in suicide rates over time appeared in those under 25 years, and a slight decline was observed in residents aged 50-74. Age-race-sex-adjusted rates proved relatively stable over the 9 years.

Geographically, race-adjusted rates by county varied from calculated expected values, with some suggestion of a pattern for the counties with the highest rates. However, no urban-rural differences were seen. Examination of methods used to commit suicide reveals that firearms were the most common means in all race-sex groups, accounting for 78.7 percent of deaths. The percentage of firearm

users was almost identical among white males and white females, differing markedly from the country as a whole. Females of both race groups were more likely to have used poisons than males, but the percentage of those who used poisons was much less than would be expected from national data.

This study confirms previous findings of sex and race differentials, rate changes with age, increasing rates in young people, and lower overall rates in the Southeast compared with the entire country. Interpretation of race-sex specific rates, together with suicide methods, lends support to the assertion that suicide rates are independent of methods. Rate trends by age groups over time are believed to have important implications.